

IX.—*Notes on Slugs, chiefly in the Collection at the British Museum.* By T. D. A. COCKERELL.

[Continued from vol. vi. p. 390.]

V. *HELICARIONINÆ*.

THE Limacidæ include a number of groups which may well be regarded as subfamilies, differing in the shell, the presence or absence of a caudal mucus-pore, and in various other ways. The subfamily Helicarioninæ may be made to include all those forms which have a mucus-pore, but do not possess a typically Zonitoid or Helicoid shell; but this definition is rather a matter of convenience than an expression of naturally defined limits, for it is actually impossible to draw any hard-and-fast line between certain *Hyalina*-like forms and their Vitrinoid allies. Similarly, were it desirable to divide the group into *Vitrina*-like and slug-like forms, the genera *Girasia* and *Austenia* would offer so many puzzling intermediates that no satisfactory limits could be found. It thus happens that, although my purpose is to treat of slugs, I am obliged to include a variety of genera which possess spiral shells.

It is necessary, however, to exclude from the Helicarioninæ certain forms which are superficially very similar to them.

Otoconcha, Hutton, resembles a *Helicarion*, but has a ribbed jaw and no caudal mucus-pore.

Hemphillia, Bld. & W. G. Binn., from Oregon, is very much like a *Girasia* in appearance and has a mucus-pore; but its jaw is ribbed. *Binneya*, J. G. Cooper, resembling a *Helicarion*, has, like *Otoconcha*, a ribbed jaw and no mucus-pore. The true Vitrininæ, consisting of *Vitrina* and allied genera, lack a mucus-pore, but otherwise stand closest to Helicarioninæ.

The teeth of Helicarioninæ are of the normal Limacid type, that is to say the centrals have a large central and two smaller lateral cusps, and the laterals are bicuspid, although on both centrals and laterals there may be obscure additional cusps. The centrals and laterals are of the quadrate type, the marginals aculeate.

Durgella, W. T. Blanford, is a *Vitrina*-like genus from the Indian region, with six species, according to Godwin-Austen. It has a mucus-pore, but the dentition is very different from Helicarioninæ, and is suggestive of Selenitidæ. It may perhaps form a subfamily—Durgellinæ—under Selenitidæ.

It now remains to classify the genera of Helicarioninæ, a matter of very considerable difficulty. After examining such specimens as I could and comparing the published descriptions and figures, especially those of Godwin-Austen, I drew up in MS. a table of the species, dividing them into what seemed the most naturally defined generic units. To do this I was obliged to make as many as five new genera among the Indian forms; but from the paucity of actual material available to me I hesitate to publish these as such, and will treat them here as sections only, leaving it to students who have better opportunities to increase the number of genera as may seem desirable.

Under each genus or section indicated below I have given only the type species, as several of the named species are so imperfectly known that it is not yet possible to say definitely where they belong.

Helicarioninæ, sensu lat.

[*Macrochlamys*, Bens., = *Nanina*, Gray (type *M. indicus*, Bens.), has a Heliciform shell and does not properly belong here; but Godwin-Austen places certain *Vitrina*-like shells, here called section *Pseudovitrinæ*, in *Macrochlamys*.]

A. Shell whorled, truly Vitrinoid.

1. Mantle little or not extending over shell.

a. No dart-sac. Species American.

i. *Vitrinozonites*, W. G. Binn. (*V. latissimus*, Lewis.)

b. With a dart-sac or "amatorial organ." Species Asiatic*.

ii. *Cryptosoma*, Theob. (*C. præstans*, Gld.)
iii. *Macrochlamys*, sect. *Pseudovitrinæ*. (*M. Flemingii*, Pfr.)

2. Mantle more developed, but shell free behind and above.

a. With an "amatorial organ." Asiatic.

iv. *Austenia*, sect. *Euausteniæ*. (*A. scutella*, Bs.)

b. With no "amatorial organ."

b¹. African. v. *Africarion*, G.-A. (*A. pallens*, G.-A.)

b². Australian vi. *Helicarion* (Fér.), G.-A. (*H. Cuvieri*, Fér., *H. helenæ*, G.-A.)

[I do not pretend to understand the relationships of the very numerous species referred to *Helicarion* by authors. From the shells alone little can be judged, and it will probably be long before the animals of all are well enough known to enable us to give an approximately final arrangement.]

* For further details concerning these see Godwin-Austen, 'Land and Freshwater Mollusca of India.'

3. Mantle still more developed and more or less covering shell behind.
- a. American. vii. *Velifera*, W. G. Binn. (*V. Gabbi*, W. G. Binn.)
- b. Asiatic. viii. *Austenia*, sect. *Cryptausteniæ*. (*A. planospira*, Bs.)
- B. Shell more or less whorled, but not truly Vitrinoid; whorls subrudimentary.
1. Spiral whorl complete below or not presenting the appearance of a smaller shell within a larger. Asiatic.
- a. Shell mostly exposed.
- a¹. Shell well formed. ix. *Austenia*, Nev. (*A. gigas*, Bs.)
- a². Shell horny. x. *Ibycus* (Heyn.), G.-A. (*I. fissidens*, Heyn., *I. sikimensis*, G.-A.)
- b. Shell exposed only by an aperture in mantle, resembling that of *Austenia*. xi. *Ibycus*, sect. *Cryptibycci*. (*I. magnificus*, G.-A., sp.)
2. Spire presenting the appearance of a small shell within a larger.
- a. Shell exposed only by an aperture in mantle. Australian.
- xii. *Parmacochlea*, E. A. Smith. (*P. Fischeri*, Smith.)
- b. Shell mostly exposed. Asiatic.
- xiii. *Africarion*, sect. *Pseudoausteniæ*. (*A. ater*, G.-A.)
3. Shell external, mytiliform. African.
- xiii a. *Estria*, Poirier. (*E. Alluandi*, Poir.)
- C. Shell slug-like, hardly or not at all whorled.
1. Shell external, mytiliform. African.
- xiv. *Aspidelus*, Morelet. (*A. Chaperi*, Morel.)
2. Shell exposed by a hole in the mantle only or entirely covered.
- a. Shell horny, exposed by a rather large aperture. Asiatic.
- xv. *Girasia*, Gray. (*G. Hookeri*, Gray.)
- b. Shell oval, rudimentary, covered, animal like *Girasia*. Asiatic.
- xvi. *Girasia*, sect. *Cryptogirasiæ*. (*G. rubrum*, G.-A.)
- c. Shell entirely concealed or exposed only by a very minute hole; mantle with pale ridges; dentition differing from *Girasia*. Asiatic. xvii. *Mariaella*, Gray. (*M. Dussumieri*, Val. MS., Gray.)
- d. Shell exposed by a small aperture or none; body more or less keeled. African. (*Urocyclidæ*, Simroth.)
- d¹. Mantle reticulate, perforate; body without lateral ridges.
- xviii. *Urocyclus*, Gray. (*U. Kirkii*, Gray.)
- d². Mantle not reticulate, hardly or not perforate; body without lateral ridges; penis-retractor muscles several.
- xix. *Elisa*, Heyn. (*E. bella*, Heyn., = *longicauda*, Fisch.)

- d³. Keel strongly flexuose; no dart-sac.
xx. *Dendrolimax*, Dohrn. (*D. Heynemanni*, Dohrn.)
- d⁴. Body with lateral ridges; "a dart-gland united with penis."
xxi. *Buettneria*, Simroth. (*B. Leuckarti*, Simr.)
- d⁵. Dart-sacs two or more, each with two darts.
xxii. *Trichotoxon*, Simr. (*T. Heynemanni*, Simr.)
- d⁶. Like *Urocyclus* and *Elisa* externally; anatomy resembling *Trichotoxon*, but no darts.
xxiii. *Atoxon*, Simr. (*A. Hildebrandti*, Simr.)
- d⁷. Similar externally; vas deferens with no kalk-sac.
xxiv. *Phaneroporus*, Simr. (*P. Reinhardti*, Simroth.)
- D. "No internal shell." Borneo.
xxv. *Daymantia*, Issel. (*D. dilecta*, Issel.)

Urocyclus and its Allies.

For a very elaborate account of these slugs see Dr. H. Simroth, "Beiträge zur Kenntniss der Nachtschnecken," in *Nova Acta Ac. Cæs. Leop.-Car. Germanicæ Nat. Cur.* 1890. In this paper several new genera are described and figured. Some of them (i. e. *Atoxon* and *Phaneroporus**) are like *Urocyclus* externally, but differ in the genitalia. I follow Dr. Simroth in keeping these as genera, although my own impulse in the matter would be to regard them merely as subgenera of *Urocyclus*.

Buettneria†, with the lateral ridges on the body, seems a conveniently-established genus, especially if it can be made to include the other ridged species, *fasciatus*, v. Mart., *acuminatus*, Poirier, and *madagascariensis*, Poirier.

Trichotoxon is very peculiar as to its dart-sacs, and apparently deserves to stand as a genus. *Dendrolimax* is sufficiently peculiar in the form of its body and very flexuose keel.

Nevertheless one suspects that when the African slugs become thoroughly well known the present established generic divisions will not be found so absolute or so trustworthy as

* I write *Phaneroporus*, as it is written so in Simroth's recent paper; but elsewhere it appears as *Phaneropus*. and Dr. Simroth has used this latter spelling in writing to me under date 28th October, 1890.

† There is a well-known genus of plants called *Buttneria*, Linn., 1767, while another genus of slugs, *Apera*, Heyn., is preoccupied by *Apera*, Adans., 1763, a subgenus of *Agrostis* with no very strong characters. The feeling seems to be that preoccupation in botany should not interfere with a zoological generic name.

they at present appear. It may be even that the whole of the present group will have to form a series of subgenera only under *Urocyclus*, in which case *T. Heynemanni*, Simr., would require a new name. The question, what constitutes a generic unit, is an extremely difficult one to answer; and in the face of the fact that genera are not by any means so naturally defined even as species one is driven to treat the whole matter as essentially one of convenience only.

For my own part I should prefer not to multiply genera more than appears absolutely necessary, and to call the minor groups simply subgenera, groups, or sections. This, however, is no better than an individual opinion, not at all shared by a numerous body of naturalists whose judgment commands respect.

Buettneria is said to have a dart-gland united with the penis, and the structure is figured by Simroth. It is worth noting that *Cryptosoma prestantis*, according to Godwin-Austen's figure, has a precisely similar structure, called by Godwin-Austen a "cæcum or calc-sac."

Urocyclus Kirkii, Gray.

There is, in the British Museum, a specimen marked (in Dr. Gray's handwriting, as Mr. Atkinson informs me) "*Urocyclus Kirkii*, Cent. Africa, Dr. Kirk, 11 May, 1864." This is evidently Gray's type, although it is not very much like his figure in Proc. Zool. Soc. 1864. It agrees with the figure of it given by Heynemann, Jahrb. 1884, Taf. i. fig. 1.

From it I made the following notes:—

Mantle finely reticulate, $17\frac{1}{2}$ millim. long, with a round posterior opening about 2 millim. diam., whence run two slight grooves as figured by Heynemann. Respiratory orifice $10\frac{1}{2}$ millim. from anterior border of mantle. Mucus-pore as figured by Heynemann. Colour ochreous, bands blackish, and body with a sort of blackish interstitial marbling. Mantle greyer. Neck dark above. Sole unicolorous, central zone slightly narrower than either lateral.

Urocyclus pallescens, sp. n.

Length (in alcohol) $31\frac{1}{2}$ millim.; uniform pale greyish ochre, spotless. Mantle reticulated, the opening only a narrow slit or small, rather oblong hole, very much smaller than in *Kirkii*, and inconspicuous. Mucus-pore smaller than in *Kirkii*. Respiratory orifice as in Heynemann's figure of *fasciatus*. Reticulation on body in longitudinal squarish

series, about twelve on each side. Mantle bluntly angulate behind. Keel indistinct, no lateral ridges.

The mantle is 12 millim. long, with the slit or opening very near its hind edge.

Central area of sole about as wide as either lateral area.

Shell, long. 6, lat. 4 millim., strong, well formed.

Described from two specimens in the British Museum from Durban, Natal (*A. E. Craven*, 1875).

This species is most nearly allied to *U. flavescens*, Keferst., of which it may prove a subspecies. Keferstein's figure (*Mal. Blatt.* 1866, *Taf. ii.*) shows a slug differing from ours in the shape of the body, and especially of the mantle, and the opening in the mantle is different. The slug described by Gibbons (*Quart. Journ. of Conch.* 1879, p. 139) as *flavescens* appears to be *fasciatus*, Martens, belonging to a different section of the genus.

U. Kraussianus, Heyn., from the Cape region, differs from *pallescens* in its colour and in the shape of the mantle; but I have been unable to find any more exact definition of it than that given by Krauss in 1848.

Elisa longicauda (Fischer).

The British Museum contains two specimens (in alcohol) labelled "*Elisa bella*, Heyn., Madagascar, from Dr. Heynemann," from which I made notes:—

Length 35 millim.; mantle smoothish, not reticulate, and I detect no perforation. Median area of sole broader than either lateral area. Tail with a well-developed mucus-pore. Body strongly carinate.

The species is a variable one, presenting three forms:—

- a. *longicauda* (Fischer). Yellowish, unicolorous.
- b. *maculata* (Fischer) = *bella* (Heyn.). One of the British-Museum specimens is of this form, being pale ochreous, with scattered grey-brown spots on body and mantle; sole pale ochre.
- c. *permaculata*, nov. Pale ochreous; body and mantle thickly marbled with dark brown, reducing the ground-colour in places to pale spots; sole brownish. Madagascar (British Museum, as above).

The reduced mantle-aperture and the non-reticulate mantle seem to give *Elisa* as good a right to be considered a genus as the other segregates from *Urocyclus* tabulated above. For a

very excellent account of the anatomy of *Elisa* see Simroth, Jahrb. 1883, Taf. ix. and pp. 289–312.

MARIAELLA, Gray.

Gray's type of *Mariaella* is in the British Museum labelled "*Clypeicella Dussumierii*, Val., Mahé."

It is $25\frac{1}{2}$ millim. long; ochreous, mantle and body slightly spotted with blackish; sole unicolorous, margins striate; mucus-pore strongly marked.

The shell is white, with a membranous or horny margin.

Several names have been given to *Mariaella*. *Clypeicella*, written sometimes *Clypidiella*, is the original MS. name of Valenciennes, passed over by Gray because there was a *Clypidella*, Swains.

Tennentia, applied to the Ceylon form, appears sometimes as a subgenus; but it has no standing, being *Mariaella* pure and simple. It is possible though that the Philippine *M.* (*Tennentia*) *philippinensis*, Semper, may be separable subgenerically or otherwise.

"*Mariaella*" *planulata*, Pfr., and "*M.*" *papillata*, Pfr., contained in the British Museum, are Vitrinoid shells widely separated from *Mariaella*. *Viqueneselia* was applied to *Mariaella* in 1859 by Fischer; but the true *Viqueneselia*, Desh., is a fossil and not even a mollusk.

Vega, Westerlund, founded on *V. Nordenskioldi*, West., from Ceylon, was described and figured in 1835. It appears to be a *Mariaella*.

Finally, *Dekhania*, Godwin-Austen, described as a subgenus of *Girasia*, is also simply *Mariaella*.

Mariaella Thwaitesi, Humbert.

Length (in alcohol) $21\frac{1}{2}$ millim.; mantle, long 11 millim.; respiratory orifice 5 millim. from anterior border; sole 4 millim. broad. Mantle elongate-ovate, subtruncate before and behind; apertures very minute or none. Colour of mantle grey-ochre, yellowish at edges; pale ridges run from the posterior part, one to the respiratory orifice and one subdorsally on the left side, fading anteriorly. Body greyish ochre, slightly streaked in lateral grooves with blackish posterior to mantle. Keel strong. Caudal pore well marked. Edge of foot with concolorous transverse grooves. Sole brownish ochre, unicolorous, striate at sides.

The above-described example appears to have no opening

in the mantle; but a second specimen, only $12\frac{1}{2}$ millim. long, shows the pale apex of the shell.

Described from two specimens in the British Museum marked "Ceylon, 25 May, 1857."

I do not at all doubt that *Mariaella* is a good genus; but the forms from the Seychelles (*Dussumieri*, Val.), from Ceylon (*Thwaitesi*, Humb.), and from South India (*Beddomei*, G.-A.) are so exceedingly allied that they can scarcely be regarded as distinct species. Very possibly the Seychelles form may have been imported from India or Ceylon. We thus arrive at this arrangement:—

MARIAELLA, Gray.

Mariaella Dussumieri, Val. MS., Gray. Seychelles Islands.

Subsp. *M. Thwaitesi* (Humb.). Ceylon.

Subsp. *M. Beddomei* (G.-Aust.). Travancore Hills, India.

Var. *nigra* (G.-Aust.). S. India.

Var. *maculosa* (G.-Aust.). S. India.

For the best account of the genus see *Dekhania* in Godwin-Austen's 'Land and Freshwater Mollusca of India,' part vi. Sept. 1887, and pl. lviii.

Limax infumatus, Fér., is apparently also to be included in *Mariaella*. It resembles *M. Beddomei*, var. *nigra*.

GIRASIA, Gray.

Girasia, Gray, Cat. Pulm. 1855, p. 61.

Parmarion, Fischer, Act. Soc. Linn. Bordeaux, 1856.

There can be no doubt that *Girasia* ought to stand in preference to Fischer's name *Parmarion*. *Girasia* is described in a British Museum Catalogue dated 29th March, 1855, and Mr. Saunders of the British Museum library informs me that this is really the date of publication. *Parmarion* is described in a paper dated June 1855, which appears in a part dated March 1856.

Girasia was practically founded on *G. Hookeri*, a well-known species of which the type still exists. *Parmarion* included four species, *infumatus*, *extraneus*, *rangianus*, and *problematicus*, all of Férussac. *P. infumatus* seems to be a *Mariaella*, *P. extraneus* is a *Girasia*, *P. problematicus* may be an *Ibicus*, while *rangianus* does not seem to belong here at all.

Girasia extranea (Fér.).

Limax extraneus, Fér. Hist. Nat. Moll. pl. viii. f. figs. 4, 5, 6, 7.

This is evidently a true *Girasia*, and surely it must be identical with *G. Hookeri*, Gray. The aperture in the mantle, the posterior ridge or line directed towards the respiratory orifice, the characteristic shape, all are those of *Hookeri*, and the colour also agrees. Of course, assuming the identity of the two, *extranea* has priority.

Girasia extranea, var. *Hookeri* (Gray).

I will treat *Hookeri* as a variety of *extranea* in deference to the opinion of those who seem to see noteworthy differences between them; but I believe that they are practically identical.

The type specimen of *Girasia Hookeri* is in the British Museum marked "Khassya, Sir W. Hooker." It is 40 millim. long (in alcohol), colour uniform dark brown. It agrees with *Hookeri* as described and figured by Godwin-Austen.

Girasia extranea, var. *brunnea* (G.-A.).

Girasia extranea, var. *shillongensis* (G.-A.).

Girasia extranea, var. *maculosa* (G.-A.).

The present species is a very variable one, and these three varieties are described by Godwin-Austen under *Hookeri*. Tryon's description of var. *brunneus* (under *shillongensis*) is not correct.

Girasia depressa, subsp. nov.

G. extranea subsp., 27½ millim. long, mantle 13½ millim. long, respiratory orifice 8¼ millim. from anterior border of mantle. Colour ochreous, pale greyish below mantle anteriorly at sides. Sole unicolorous, orangy-ochre. Mucus-pore well developed. Shell brown, semitransparent, horny.

Described from an alcoholic specimen in the British Museum marked "*Girasia Hookeri*, Rve., Teria Ghat."

This subspecies (possibly species) differs from *Hookeri* or *extranea* in several ways. The mantle of *Hookeri* is strongly convex antero-posteriorly, that of *G. depressa*, viewed from the side, is practically flat. The respiratory orifice is less anterior and the orifice in the mantle above the shell is much larger in *depressa* than in *Hookeri*. The shell of *depressa*, in the specimen I examined, projects out of the opening.

The characters of the mantle in *depressa* are peculiar, for there are ridges exactly in the position of those in *Mariaella*. One of these pale ridges passes from the respiratory orifice backwards and the other from the front to the end of the mantle on the left side. There is also a sulcus, suggesting that of *Amalia*, visible as a curved line on the right side, its convexity towards the respiratory orifice.

Girasia affinis, sp. n.

Length 42 millim. (in alcohol); middle portion of mantle swollen; body high, truncate posteriorly in contraction. Aperture in mantle circular, only $3\frac{1}{2}$ millim. in diameter. Colour ochre, with grey mottling on mantle and body. Mantle without ridges. Shell brown, shiny.

Described from a specimen in the British Museum labelled "*Austenia peguensis*, Theob., Pegu (Theobald)." Certainly, from the label, this ought to be the genuine *peguensis*, and it agrees in general appearance very well with Godwin-Austen's figure of that species. But Godwin-Austen's figure is of a slug in which the shell is mainly exposed, as in *Austenia*, whereas *G. affinis* is a *Girasia* in the strictest sense. Theobald's original description says *peguensis* is like *Austenia gigas* in miniature, thus confirming Godwin-Austen's account, besides which the latter also had his specimens from Theobald.

The typical form of *peguensis* is yellowish, without spots.

It is thus plain that two very different species have been labelled *peguensis*, namely the true species of that name, well treated of by Godwin-Austen, and a species closely allied to *G. extranea*, for which I propose the name of *affinis*.

Ibycus sikkimensis (G.-Aust.) = *fissidens*, Heyn.

$27\frac{1}{2}$ millim. long (in alcohol), mantle 17 millim. long; hind of mantle to end of tail $6\frac{1}{3}$ millim., hind $6\frac{1}{3}$ millim. of mantle free, making the back altogether about $12\frac{2}{3}$ millim. long. Mantle notched in front, anterior part of mantle slightly granulose. Shell-aperture very large. Tail-gland conspicuous. Tail slightly dark-reticulate on each side of keel. General colour dull ochre, sides of neck dark grey, anterior part of mantle slightly marbled with grey. Sole unicolorous. Shell thin, chestnut-brown above, white (calcareous) below.

Known by its marbled anterior part of mantle and the short tail projecting beyond the mantle.

Described from a specimen, "purchased at Stevens," in the British Museum without locality.

Ibycus fissidens, Heyn., 1862, was very insufficiently described; but as it agrees with *sikkimensis* in all known points and was from the same neighbourhood, though at a higher altitude, there seems no reason for regarding it as distinct. Heynemann's name has priority. *Ibycus*, as a generic title, may perhaps be used for a large series of forms allied to *fissidens*, including *I. pupillaris* (Humb.) from Java.

Limax problematicus, Fér., pl. viii. F. figs. 13-17, belongs to *Ibycus*, and seems allied to *sikkimensis*.

Ibycus siamensis, sp. n.

Length about 30 millim., mantle $17\frac{1}{2}$ millim. long. Mantle prolonged anteriorly, as usual in *Ibycus*. Shell that of *Girasia*, but exposed like *Austenia*, apparently not whorled, thin, convex. There is a black band on each side of the keel, as in *Africarion ater*, vars. *aterrimus* and *cinereus*, though higher up, *i. e.* next to keel, not a little way from it. Colour dark grey above, more or less mottled with darker, sides below mantle pale. Foot-fringe alternating whitish and grey. Sole pale ochry, unicolorous.

Described from two alcoholic specimens from Siam in the British Museum. It is a rather puzzling form, in some ways resembling both *Africarion ater* and *Ibycus pupillaris* in some of their varieties. Perhaps it will prove to be a subspecies or race of *Africarion ater*.

LACONIA, Gray.

Laconia Férussaci, Gray, is founded on Férussac's figure of "*Vitrina*, sp.," on pl. viii. F. figs. 10, 11, 12. Gray gives the shell as covered by the mantle, but the figure looks as if a *Helicarion*-like shell had been removed. There is a well-formed mucus-pore. A little slug in the British Museum from Ceylon is evidently similar; the shell is gone. There is an anterior extension of the mantle.

Laconia is probably identical with *Austenia*; but as some uncertainty remains, I do not adopt the earlier name of Gray for that genus.

[To be continued.]

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